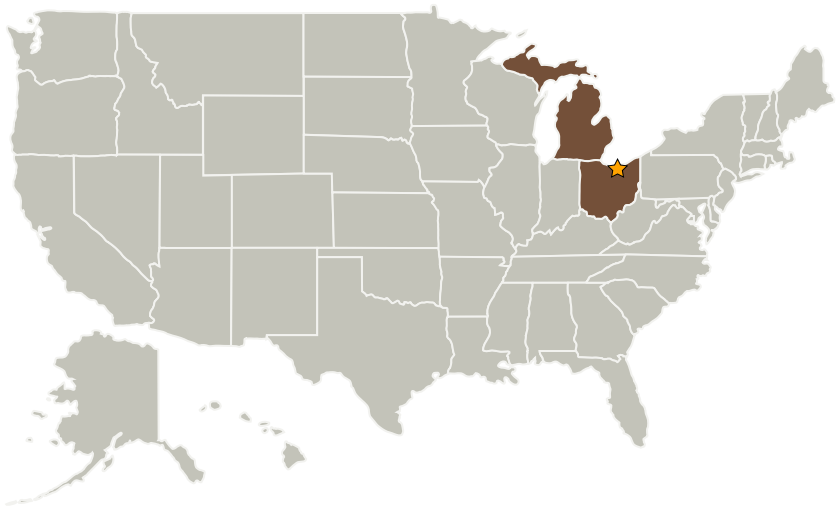
Time Domain Terahertz Axial Computed Tomography Non Destructive Evaluation, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

We propose to demonstrate key elements of feasibility for a high speed automated time domain terahertz computed axial tomography (TD-THz CT) non destructive evaluation (NDE) system which would provide true three dimensional images of aerospace composite structures. Traditional time domain terahertz reflection tomographic imaging captures only a single view of an object, generating images of laminar structure similar to an ultrasound "B-Scan". This reflection tomographic imaging is limited, however, in revealing only the laminar structure which presents a clear specular reflection from each interface. Furthermore, traditional time domain terahertz reflection tomographic imaging has substantial difficulty in determining the layer index of refraction an absorption properties without ambiguity. We propose to overcome these limitations by utilizing true computed axial tomographic reconstruction of the images. This method acquires not one view, but many radial axial views, generating a sinogram which can be used to reconstruct images using a derivative of standard X-Ray CT filtered back-projection. The sinogram can be generated by the transmission absorbance, transmission time of flight, and, in principle, reflection measurements. The reconstructed TD-THz CT images are 3D maps of the absorption coefficients and/or the index of refraction of the subsurface material.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Picometrix, LLC	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
Michigan	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Zimdars

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.5 Nondestructive Evaluation and Sensors